

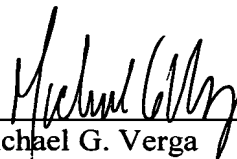
REMARKS

This is a Preliminary Amendment in which the Applicant has amended the specification to correct typographical errors and add new claims directed to a method for graphically annotating a waveform display in a signal measurement system. No new matter has been added.

This application is a divisional application of U.S. Patent No. 09/185,410, and accompanies a substitute application of the original parent application submitted pursuant to 37 CFR 1.52. The page and line numbers identified above reference the substitute application.

Attached hereto is a document entitled "Version With Markings To Show Changes Made," including a marked-up version of the foregoing amendments to the specification and claims.

Respectfully submitted,



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Version With Markings To Show Changes Made

**[Submitted with Preliminary Amendment filed with Application filed as a
Continuation Application of Application No. 09/185,410.]**

In the Title

On page 1, lines 1 and 2, amend the title as shown below:

**[SYSTEM AND] METHOD FOR GRAPHICALLY ANNOTATING
A WAVEFORM DISPLAY IN A SIGNAL-MEASUREMENT SYSTEM**

In the Specification

On page 1, lines 4-9, the "Related Application" section has been amended as follows:

RELATED APPLICATIONS [APPLICATION]

This application is a divisional application of U.S. Utility Patent Application 09/185,410 filed November 3, 1998, now pending.

This application is related to commonly owned U.S. Utility Patent Application entitled "System and Method for Annotating a Graphical User Interface Display in a Computer-Based System, " filed November 3, 1998 [concurrently herewith] under Attorney Docket Number 10982428-1, and naming as inventor Jay A. Alexander.

The paragraph that extends from page 2, line 1 to page 2, line 13 has been amended as follows:

There are many types of display elements that can be presented in signal measurement systems in general and in test and measurement instruments in particular. For example, in addition to the waveforms representing the signals currently received at

the channel inputs, waveforms referred to as function waveforms may also be displayed. Function waveforms are waveforms created by processing one or more signal waveforms. Such processing may include, for example, performing arithmetic manipulations on a signal waveform or combining multiple input signal waveforms in some predetermined manner. The resulting function waveforms are stored in a display memory for subsequent retrieval and display. In addition, memory waveforms may also be displayed. Memory waveforms are waveforms which have been previously captured and stored in a memory device of the signal measurement system. In addition to the above waveforms, other display elements such as marker indicators, trigger indicators, etc., are typically displayed.

The paragraph that extends from page 3, line 28 to page 4, line 9 has been amended as follows:

Subsequent evaluation of the waveforms due to, for example, problems identified during the manufacturing of the DUT, requires a comparison to be made between the current performance of the DUT and the previously-documented characterizations made during product design or component qualification. Unfortunately, the information contained in the above laboratory notes is often incomplete or difficult to correlate with the acquired signals obtained during the current test process. Furthermore, this process is often time consuming or not possible due to the misplacement of the original test results and related information. As a result, additional time must be expended to repeat tests which have been performed previously. Oftentimes, a previous test cannot be repeated due to a change in vendors, lack of part inventories, etc. This results in further costs being expended to recharacterize [recharacterized] the DUT.

The paragraph that extends from page 6, line 3 to page 6, line 10 has been amended as follows:

The present invention is a real-time annotation system and methodology for annotating measurement waveforms in a signal measurement system that includes a graphical user interface for displaying waveforms and measurement results on a signal measurement system display. Generally, the [he] annotation system enables an operator

to generate a graphical annotation label containing any desired data, and to graphically position the annotation label at any desired location on the measurement display, enabling the operator to positionally associate the graphical annotation label with a desired waveform or waveform feature displayed on the graphical user interface.

The paragraph that extends from page 12, line 14 to page 12, line 19 has been amended as follows:

Various embodiments of the present invention provide certain advantages and overcome certain drawbacks of the above and other conventional techniques. Not all embodiments of the present invention share the same advantages and those that do may not share them under the same or similar circumstances. This being [the] said, the present invention provides numerous advantages, including those identified herein below.

The paragraph that extends from page 16, line 9 to page 16, line 18 has been amended as follows:

Figure 1 is a functional block diagram of an exemplary digital oscilloscope suitable for implementing the present invention. [Figure 1 is a functional block diagram of an exemplary computer-based system also suitable for implementing the present invention.] Referring to Figure 1, the digital oscilloscope 100 is a commonly-available digital oscilloscope designed to acquire, analyze, and display a wide variety of signals generally in terms of signal voltage versus time. The digital oscilloscope 100 preferably includes a general purpose computer system, which is programmable using a high-level computer programming language and specially programmed, special purpose hardware for performing signal acquisition, analysis and display functions.

In the Claims

The claims have been amended as follows:

1. (Canceled) An annotation system for graphically annotating measurement waveforms in a signal measurement system having a graphical user interface through which waveforms and measurement results are displayed on a display of the signal

measurement system, the annotation system constructed and arranged to enable an operator to graphically generate an annotation label containing operator-generated information and to graphically alter the position of said annotation label such that said annotation label is positionally associated with a desired feature of a waveform displayed on said graphical user interface.

2. (Canceled) The system of claim 1, wherein said information is predefined.
3. (Canceled) The system of claim 1, wherein said information includes graphical representations.
4. (Canceled) The system of claim 1, wherein said information is presented in one or more forms comprising at least one of textual and symbolic form.
5. (Canceled) The system of claim 1, wherein said information is provided by the operator using a keyboard.
6. (Canceled) The system of claim 5, wherein said keyboard is a physical keyboard operatively coupled to the signal measurement system on which the operator types the desired information.
7. (Canceled) The system of claim 5, wherein said keyboard is a graphically-displayed keyboard on which the operator graphically selects displayed keys of the graphical keyboard through use of a cursor controlled by a pointing device operatively coupled to said signal measurement system.
8. (Canceled) The system of claim 1, wherein the information is entered by the operator through a voice recognition system.
9. (Canceled) The system of claim 1, wherein the operator can control appearance characteristics of said plurality of annotation labels displayed on said graphical user interface.

10. (Canceled) The system of claim 1, wherein said desired location of said plurality of annotation labels includes positions that positionally associate said displayed annotation labels with a desired waveform or waveform feature displayed on said graphical user interface, and

wherein one or more of said plurality of annotation labels includes additional graphical elements to facilitate visual association with said desired waveform or waveform feature.

11. (Canceled) The system of claim 1, wherein said annotation label is implemented as dialog box in said graphical user interface.

12. (Canceled) The system of claim 1, wherein said annotation label is implemented as a window in said graphical user interface.

13. (Canceled) The system of claim 1, wherein said annotation system comprises:
a plurality of label control units each constructed and arranged to control operator interactivity with an associated annotation label rendered on the graphical user interface, said plurality of label control units providing the operator with the capability to determine content and display location of said associated annotation label; and

an annotation label manager constructed and arranged to provide centralized control over invocation and removal of each of said plurality of label control units and, hence, of said display of said associated annotation labels.

14. (Canceled) The system of claim 13, wherein said annotation label manager maintains, in a label state data structure, a current state of each of said plurality of associated annotation labels currently rendered on said graphical user interface, said current state including said position and said content of said displayed annotation labels.

15. (Canceled) The system of claim 13,
wherein the label control unit is constructed and arranged to enable the operator to determine an appearance of said plurality of displayed annotation labels.

16. (Canceled) The system of claim 15, wherein said annotation label manager maintains, in a label state data structure, a current state of each of said plurality of associated annotation labels currently rendered on said graphical user interface, said current state including said appearance of said displayed annotation labels.
17. (Canceled) The system of claim 16, wherein said label state data structure is globally accessible to other elements of the signal measurement system.
18. (Canceled) The system of claim 13, wherein said graphical user interface displays at least one first display element in connection with a displayed annotation label, said graphical user interface generating function calls to said label control unit associated with said displayed annotation label in response to a graphically selection of said first display element.
19. (Canceled) The system of claim 18, wherein said graphical user interface further displays at least one second display element not in connection with a displayed annotation label, said graphical user interface generating function calls to said annotation label manager in response to a graphically selection of said second display element.
20. (Canceled) The system of claim 19,
wherein said function calls provided to said plurality of label control units from said graphical user interface related to creation and deletion of said plurality of annotation labels are forwarded to said annotation label manager.
21. (Canceled) The system of claim 20, wherein said annotation label manager is constructed and arranged to generate, in response to said creation and deletion function calls generated by said graphical user interface, system calls that cause an operating system to create and destroy specified ones of said label control units.
22. (Canceled) The system of claim 15,

wherein function calls provided to said plurality of label control units from graphical user interface relevant to said appearance of said associated annotation labels are forwarded to said annotation label manager.

23. (Canceled) The system of claim 13, wherein said annotation label manager stores in a memory device default values for said location and said content of said displayed annotation labels.

24. (Canceled) The system of claim 15, wherein said annotation label manager stores in a memory device default values for said location, said appearance and said content of said displayed annotation labels.

25. (Canceled) The system of claim 24, wherein said default values are dynamically maintained in real-time, updated to reflect recent selections of the operator.

26. (Canceled) The system of claim 14, wherein said current state comprises:
a label number uniquely identifying each displayed annotation label;
a label pointer providing an address of said label control unit that generated said annotation label;
location information identifying a current location of said annotation label on the display; and
label content information identifying contents of said annotation label.

27. (Canceled) The system of claim 26, wherein said current state further comprises:
rendering information identifying an appearance of said annotation label when said annotation label is rendered on the graphical user interface.

28. (Canceled) The system of claim 27, wherein said current state further comprises:

a reference symbol identifier that identifies a location of a file that contains a graphical symbol that visually associates said annotation label with a graphical element displayed on the graphical user interface.

29. (Canceled) The system of claim 27, wherein said rendering information comprises:

text color identifying a color of text rendered in said annotation label; and
background color identifying a color of background area of said annotation label.

30. (Canceled) The system of claim 29, wherein said rendering information further comprises:

a font specification identifying a font size of text rendered in said annotation label.

31. (Canceled) The system of claim 30, wherein said rendering information further comprises:

an outline specification identifying whether a predefined border is to be rendered around said annotation label.

32. (Canceled) The system of claim 23, wherein said default location has a first value that causes said annotation labels to be located at an origin of said display.

33. (Canceled) The system of claim 20, wherein the default location has a second value that causes said annotation labels to be located at a current position of the cursor.

34. (Canceled) The system of claim 16, wherein said label control unit reconciles positional conflicts between new annotation labels and currently rendered annotation labels, said location of said annotation labels stored in said label state data structure.

35. (Canceled) The system of claim 13, wherein said annotation system restricts said location of said plurality of annotation labels to locations entirely within said waveform display region, said restriction based on rectangle limits data identifying

dimensions of said waveform display region, said location and size of each of said plurality of annotation labels.

36. (Canceled) The system of claim 13, wherein each said label control unit comprises:

a display controller constructed and arranged to interoperate with said graphical user interface to display and control said display and operator interactivity with said associated annotation label on said graphical user interface; and

a position controller constructed and arranged to control said location and size of said associated annotation label.

37. (Canceled) The system of claim 36, wherein each said position controller is constructed and arranged to determine a size and position of said associated annotation label to enable said associated annotation label to be completely rendered within boundaries of a waveform display region.

38. (Canceled) The system of claim 36, wherein each said label control unit further comprises:

a command processor constructed and arranged to route certain function calls from said graphical user interface to annotation label manager and forwards certain commands to said display controller and to said positional controller.

39. (Canceled) The system of claim 13, wherein said annotation label manager comprises:

an annotation label generation control unit constructed and arranged to instantiate and destroy label control units based on said create and delete function calls; and

an annotation label maintenance unit constructed and arranged to maintain said label state data structure, said maintenance unit receiving rendering information from said graphical user interface and updating said label state data structure with such information to maintain said annotation label current state.

40. (Canceled) The system of claim 39, wherein said annotation label generation control unit is further constructed and arranged to store annotation label default values in a default values data structure.
41. (Canceled) The system of claim 40, wherein said annotation label generation control unit is further constructed and arranged to determine initial values for rendering an annotation label.
42. (Canceled) A signal measurement system comprising:
an operating system;
a graphical user interface; and
an annotation system for graphically annotating measurement waveforms displayed in a waveform display of the graphical user interface, said annotation system constructed and arranged to enable an operator to graphically generate an annotation label containing operator-generated information and to position said annotation label to any location on the waveform display.
43. (Canceled) The system of claim 42, wherein the operator can control appearance characteristics of said plurality of annotation labels displayed on said graphical user interface.
44. (Canceled) The system of claim 42, wherein said location of said plurality of annotation labels includes positions that positionally associate said displayed annotation labels with a desired waveform or waveform feature displayed on said graphical user interface, and
wherein one or more of said plurality of annotation labels includes additional graphical elements to facilitate visual association with said desired waveform or waveform feature.
45. (Canceled) The system of claim 42, wherein said annotation system comprises:
a plurality of label control units each constructed and arranged to control operator interactivity with an associated annotation label rendered on the graphical user interface,

said plurality of label control units providing the operator with the capability to determine content and display location of said associated annotation label; and

an annotation label manager constructed and arranged to provide centralized control over invocation and removal of each of said plurality of label control units and, hence, of said display of said associated annotation labels.

46. (Canceled) The system of claim 45, wherein said annotation label manager maintains, in a label state data structure, a current state of each of said plurality of associated annotation labels currently rendered on said graphical user interface, said current state including said position, appearance and said content of said displayed annotation labels.

47. (Canceled) The system of claim 46, wherein said label state data structure is globally accessible to other elements of the signal measurement system.

48. (Canceled) The system of claim 42, wherein said annotation label manager is constructed and arranged to generate, in response to said creation and deletion function calls generated by said graphical user interface, system calls that cause an operating system to create and destroy specified ones of said label control units.

49. (Canceled) The system of claim 47, wherein said annotation label manager stores in a memory device default values for said location, said appearance of said content of said displayed annotation labels.

50. (Canceled) The system of claim 49, wherein said current state comprises:
a label number uniquely identifying each displayed annotation label;
a label pointer providing an address of said label control unit that generated said annotation label;
location information identifying a current location of said annotation label on the display; and
label content information identifying contents of said annotation label.

51. (Canceled) The system of claim 50, wherein said current state further comprises:

rendering information identifying an appearance of said annotation label when said annotation label is rendered on the graphical user interface.

52. (Canceled) The system of claim 45, wherein each said label control unit comprises:

a display controller constructed and arranged to interoperate with said graphical user interface to display and control said display and operator interactivity with said associated annotation label on said graphical user interface; and

a position controller constructed and arranged to control said location and size of said associated annotation label.

53. (Canceled) The system of claim 52, wherein each said position controller is constructed and arranged to determine a size and position of said associated annotation label to enable said associated annotation label to be completely rendered within boundaries of a waveform display region.

54. (Canceled) The system of claim 52, wherein each said label control unit further comprises:

a command processor constructed and arranged to route certain function calls from said graphical user interface to annotation label manager and forwards certain commands to said display controller and to said positional controller.

55. (Canceled) The system of claim 45, wherein said annotation label manager comprises:

an annotation label generation control unit constructed and arranged to instantiate and destroy label control units based on said create and delete function calls; and

an annotation label maintenance unit constructed and arranged to maintain said label state data structure, said maintenance unit receiving rendering information from said graphical user interface and updating said label state data structure with such information to maintain said annotation label current state.

56. (Canceled) The system of claim 55, wherein said annotation label generation control unit is further constructed and arranged to store annotation label default values in a default values data structure.

57. (Canceled) The system of claim 56, wherein said annotation label generation control unit is further constructed and arranged to determine initial values for rendering an annotation label.

58. (Amended) A method for graphically displaying [modifying] an annotation label on a graphical user interface;

(1) displaying on [a] the graphical user interface a first display element representing the function of adding an annotation label;

(2) receiving an indication that an operator graphically selected [graphically selecting] said [annotation] first display element;

(3) displaying, on the graphical user interface, a display region through which the operator can [dialog box providing the operator with the ability to] enter a desired content to be displayed in the annotation label;

(4) receiving through a user interface data to be displayed in [graphically entering data into] said dialog box; and

(5) displaying said annotation label on said graphical user interface.

59. (New) The method of claim 58, wherein said first display element comprises any known display element supported by the graphical user interface.

60. (New) The method of claim 58, wherein said first display element comprises an icon.

61. (New) The method of claim 58, wherein said first display element comprises a graphical button rendered on a dialog box.

62. (New) The method of claim 58, wherein said display region through which the operator can enter a desired content to be displayed in the annotation label is a window.

63. (New) The method of claim 58, wherein said display region through which the operator can enter a desired content to be displayed in the annotation label is a dialog box

64. (New) The method of claim 58, wherein said data to be displayed in said dialog box comprises data in the form of text strings.

65. (New) The method of claim 58, wherein said data to be displayed in said dialog display region comprises data in the form of graphical symbols.

66. (New) The method of claim 58, wherein said data to be displayed in said dialog display region comprises data in the form of graphical symbols.

67. (New) The method of claim 58, further comprising the steps of:
displaying a second display element on the graphical user interface indicating that the operator has the opportunity to alter the manner in which the annotation label is rendered;
receiving an indication that the operator has selected said second display element;
displaying, in response to said indication that the operator has selected said second display element, a rendering options display window on the graphical user interface;
receiving operator inputs applied to said rendering options display window; and
displaying said annotation label in accordance with said operator inputs to said rendering options display window.

68. (New) A method for graphically annotating measurement waveforms in a signal measurement system having a graphical user interface through which waveforms and measurement results are displayed on a display of the signal measurement system, the method comprising the steps of:

graphically generating, in response to an operator request, an annotation label containing operator-generated information; and

graphically positioning said annotation label at a location on the display determined by the operator.

69. (New) The method of claim 68, wherein said location of said annotation label is such that said annotation label is positionally associated with a desired feature of a waveform displayed on the display.

70. (New) The method of claim 68, wherein said information is presented in one or more forms comprising at least one of textual and symbolic form.

71. (New) The method of claim 68, wherein said information is provided by the operator using a keyboard operatively associated with the signal measurement system.

72. (New) The method of claim 71, wherein said keyboard is a graphically-displayed keyboard on which the operator graphically selects displayed keys of the graphical keyboard through use of a cursor controlled by a pointing device operatively coupled to said signal measurement system.

73. (New) The method of claim 68, wherein the information is entered by the operator through a voice recognition system.

74. (New) The method of claim 68, further comprising the steps of:
adjusting appearance characteristics of said annotation label displayed on said graphical user interface in response to operator commands.

75. (New) The method of claim 68, wherein said annotation label is implemented as dialog box.

76. (New) The method of claim 74, wherein said appearance characteristics comprise one or more of the group consisting of color in which data is rendered in the annotation label, background color of the annotation label, and border characteristics of the annotation label.

77. (New) In a signal measurement system comprising an operating system and a graphical user interface, a method for graphically annotating measurement waveforms displayed in a waveform display of the graphical user interface, the method comprising:

enabling an operator to graphically generate an annotation label containing operator-generated information; and

enabling an operator to position said annotation label to any location on the waveform display.

78. (New) The system of claim 76, wherein the operator can control appearance characteristics of said plurality of annotation labels displayed on said graphical user interface.
